APPENDIX B:

ASSUMPTIONS AND GENERAL FORMULAS

Assumptions Summary used in the Modeling of the Pasadena GHG Reduction Plan

Emission estimates for the various scenarios were derived from EMFAC2007 and the URBEMIS2007 emissions models for CO2 emissions associated with transportation emissions and some area source emissions including landscape equipment. Many assumptions went into modeling of the emissions for the City of Pasadena GHG Reduction Plan, including customized land uses. The following briefly describes some of those assumptions followed by a detailed set of tables outlining the various land use quantification used in the modeling.

Modeling of transportation emissions included reductions in all years (1990, 2007, and 2020) for robust pedestrian infrastructure, which was modeled by affording sidewalks along all of the streets within Pasadena.

The Gold Line light rail service was placed into operation in 2003 and had partial utilization within the City of Pasadena in year 2007. Participation in the Gold Line spiked in 2008 coinciding with a precipitous rise gasoline prices. This spike in the 2008 ridership achieved near full capacity of the transit line. Current ridership in the gold line is lower than the 2008 spike but remains higher than 2007 and earlier years ridership. Unfortunately, the URBEMIS model cannot quantify partial utilization of transit. For this reason, the 2007 modeling did not include the transit line. However, the 2020 Business as Usual (BAU), 2020 with City Programs, and 2020 with City Programs plus additional reductions includes full participation and enhancement of the Gold Line light rail services. These reductions include transit oriented land uses in close proximity to the Gold Line transit stations.

Several land uses were modeled in URBEMIS using customized trip rates. These land uses include mixed uses (primarily residential with commercial), vehicle repair and the Rose Bowl Stadium. Details of the trip rates used for these land uses can be found on pages 33 and 34 of this appendix and used documented trip rates published by the San Diego Association of Governments (SANDAG). These trip rates were utilized for the City of Pasadena because of the documented data that supports the trip rates.

Growth rates used in modeling the increase in land uses for year 2020 utilize historical growth rates for the last eight years (2000 through 2008) found in the California Department of Finance(DOF) Statistics. They are as follows:

Year	Population	Percent Change
2000	133,936	NA (starting Point in determining change in population)
2001	135,511	1.16%
2002	138,742	2.33%
2003	141,974	2.28%
2004	143,658	1.17%
2005	145,285	1.12%
2006	145,834	0.38%
2007	146,452	0.42%
2008	148,126	1.13%
		1.25% annual average growth rate.

This annual average growth rate per year is considered high for several reasons. One primary reason is that it was calculated based upon the City's highest growth period in recent history and is not expected to be repeated in the future. A second is that the DOF estimates exceed significantly those of other sources, including the U.S. Census Bureau estimates. However, from an emissions reduction planning point of view it is considered advantageous to plan for this aggressive growth rate. Therefore, it was used in the analysis.

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
1990

Land Use Type (units)	Natural gas usage rate from EIA (MMBTU/year)	Kilowatt-hour/ year	Potable Water Usage (gallons/year)	Solid Waste (lbs/year)
Single Family Housing	800238.3557	317304285.9	1443961978	142632891
Apartments Low Rise	798535.7209	316616860	1441302748	142256799
Condo/Townhouse General	105989.0163	42792262.93	191464571.7	23411727
Congregate Care Facility	2128.293499	859282.3882	3545640.217	470115
Day-Care Center	2128.293499	859282.3882	3545640.217	470115
Elementary School	6810.539198	2749703.642	12409740.76	1504368
Junior High School	851.3173997	343712.9553	886410.0542	188046
High School	6384.880498	2577847.165	11523330.7	1410345
Junior College (2 yr)	8938.832697	3608986.03	15955380.98	1974483
College/University (4 yr)	2128.293499	859282.3882	3545640.217	470115
Library	4256.586999	1718564.776	7977690.488	940230
Place of Worship	26816.49809	10826958.09	48752552.98	5923449
City Park	0	17185647.76	1179811782	102203001
Racquet Club	2979.610899	1202995.343	5318460.325	658161
Racquetball/Health	425.6586999	171856.4776	886410.0542	94023
Quality Restaurant	6384.880498	2577847.165	11523330.7	1410345
Fast Food Rest. w/ drive-through	851.3173997	343712.9553	1772820.108	188046
Hotel	7661.856598	3093416.598	14182560.87	1692414
Motel	3830.928299	1546708.299	7091280.434	846207
Free-standing discount store	52356.02008	21138346.75	94845875.8	11564829
Regnl Shop Ctr.	34904.01339	14092231.17	62935113.85	7709886
Strip Mall	8938.832697	3780842.508	17728201.08	2162529
Hardware/paint store	851.3173997	343712.9553	1772820.108	188046
Supermarket	4682.245699	1890421.254	7977690.488	1034253
Convenience Market w/ gas pump	425.6586999	171856.4776	886410.0542	94023
Bank (with drive-through)	2553.952199	1031138.866	4432050.271	564138
General Office Building	273698.544	110503715.1	493730400.2	60456789
Government Office Building	12344.1023	4983837.852	22160251.36	2726667
Government (Civic Center)	2128.293499	859282.3882	4432050.271	470115
Medical Office Building	7236.197898	2921560.12	13296150.81	1598391
Hospital	1944834.6	779426354.3	3511070225	395460738
Warehouse	6384.880498	2577847.165	11523330.7	1410345
General Light Industry	32350.06119	13061092.3	58503063.58	7145748
Industrial Park	17452.00669	7046115.583	31024351.9	3854943
Mixed Use	17452.00669	7046115.583	31024351.9	3854943
Vehicle Repair	10641.4675	4296411.941	18614611.14	2350575
Vehicle Sales/Rental	9790.150097	3952698.986	17728201.08	2162529
Govt Utilities	10215.8088	4124555.463	18614611.14	2256552
Stadium	20005.95889	8077254.449	36342812.22	4419081

All Electric, Natural Gas, Potable Water and Solid Waste were determined as a percentage of total annual city usage based on land use type. City Park percentages were augmented to provide a more accurate account of actual park usages.

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
1990

Consumption Totals

	Natural Gas (MMBTU/year)	Electric (kWh/year)	Potable Water (gallons/year)	Solid Waste (lbs/year)
Total Annual Consumption		1718564776		
Natural Gas Fired Plants		392347264		
Intermountain Coal Fired (Utah)		1320169513		
Purchased		6048000		
Natural Gas	4256587			
Other Fuels				
Potable Water			8864100542	
Solid Waste Disposal				940230000

Potable Water Production

		acre feet per year	conversion factor	gallons/ year
total acre feet/year	39424.53			
% from local wells	31	12221.6043	325851	3982421983
% purchased	69	27202.9257	325851	8864100542

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
1990

Percentages by Land Use

Land Use Type (units)	Natural Gas			Electric		
	% of sq ft	Ratio of unit to SQFT	Square Feet	% of sq ft	Ratio of unit to SQFT	Square Feet
Single Family Housing	0.188	1800	44809200	0.184633	1800	44809200
Apartments Low Rise	0.1876	1800	44715600	0.184233	1800	44715600
Condo/Townhouse General	0.0249	1800	5932800	0.0249	1800	5932800
Congregate Care Facility	0.0005	80	120720	0.0005	80	120720
Day-Care Center	0.0005	0	107682	0.0005	0	107682
Elementary School	0.0016	40	388720	0.0016	40	388720
Junior High School	0.0002	40	39200	0.0002	40	39200
High School	0.0015	40	348680	0.0015	40	348680
Junior College (2 yr)	0.0021	40	494240	0.0021	40	494240
College/University (4 yr)	0.0005	40	113440	0.0005	40	113440
Library	0.001	0	234286	0.001	0	234286
Place of Worship	0.0063	0	1512638	0.0063	0	1512638
City Park	0	0	0	0.01	0.01	36612180
Racquet Club	0.0007	0	163260	0.0007	0	163260
Racquetball/Health	0.0001	0	25684	0.0001	0	25684
Quality Restaurant	0.0015	0	354644	0.0015	0	354644
Fast Food Rest. w/ drive-through	0.0002	0	41571	0.0002	0	41571
Hotel	0.0018	325	428675	0.0018	325	428675
Motel	0.0009	325	210275	0.0009	325	210275
Free-standing discount store	0.0123	0	2943756	0.0123	0	2943756
Regnl Shop Ctr.	0.0082	0	1957634	0.0082	0	1957634
Strip Mall	0.0021	0	555738	0.0022	0	555738
Hardware/paint store	0.0002	0	44193	0.0002	0	44193
Supermarket	0.0011	0	257327	0.0011	0	257327
Convenience Market w/ gas pump	0.0001	0	31054	0.0001	0	31054
Bank (with drive-through)	0.0006	0	134624	0.0006	0	134624
General Office Building	0.0643	0	15317193	0.0643	0	15317193
Government Office Building	0.0029	0	692170	0.0029	0	692170
Government (Civic Center)	0.0005	0	126477	0.0005	0	126477
Medical Office Building	0.0017	0	404843	0.0017	0	404843
Hospital	0.4569	80	108917280	0.453533	80	1.09E+08
Warehouse	0.0015	0	346103	0.0015	0	346103
General Light Industry	0.0076	0	1823270	0.0076	0	1823270
Industrial Park	0.0041	0	970089	0.0041	0	970089
Mixed Use	0.0041	0	971442	0.0041	0	971442
Vehicle Repair	0.0025	0	589246	0.0025	0	589246
Vehicle Sales/Rental	0.0023	0	552950	0.0023	0	552950
Govt Utilities	0.0024	0	565349	0.0024	0	565349
Stadium	0.0047	0	1124000	0.0047	0	1124000

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
1990

Percentages by Land Use

Land Use Type (units)	Potable Water			Solid Waste		
	% of sq ft	Ratio of unit to SQFT	Square Feet	% of sq ft	Ratio of unit to SQFT	Square Feet
Single Family Housing	0.1629	1800	44809200	0.1517	1800	44809200
Apartments Low Rise	0.1626	1800	44715600	0.1513	1800	44715600
Condo/Townhouse General	0.0216	1800	5932800	0.0249	1800	5932800
Congregate Care Facility	0.0004	80	120720	0.0005	80	120720
Day-Care Center	0.0004	0	107682	0.0005	0	107682
Elementary School	0.0014	40	388720	0.0016	40	388720
Junior High School	0.0001	40	39200	0.0002	40	39200
High School	0.0013	40	348680	0.0015	40	348680
Junior College (2 yr)	0.0018	40	494240	0.0021	40	494240
College/University (4 yr)	0.0004	40	113440	0.0005	40	113440
Library	0.0009	0	234286	0.001	0	234286
Place of Worship	0.0055	0	1512638	0.0063	0	1512638
City Park	0.1331	0	36612180	0.1087	0	36612180
Racquet Club	0.0006	0	163260	0.0007	0	163260
Racquetball/Health	0.0001	0	25684	0.0001	0	25684
Quality Restaurant	0.0013	0	354644	0.0015	0	354644
Fast Food Rest. w/ drive-through	0.0002	0	41571	0.0002	0	41571
Hotel	0.0016	325	428675	0.0018	325	428675
Motel	0.0008	325	210275	0.0009	325	210275
Free-standing discount store	0.0107	0	2943756	0.0123	0	2943756
Regnl Shop Ctr.	0.0071	0	1957634	0.0082	0	1957634
Strip Mall	0.002	0	555738	0.0023	0	555738
Hardware/paint store	0.0002	0	44193	0.0002	0	44193
Supermarket	0.0009	0	257327	0.0011	0	257327
Convenience Market w/ gas pump	0.0001	0	31054	0.0001	0	31054
Bank (with drive-through)	0.0005	0	134624	0.0006	0	134624
General Office Building	0.0557	0	15317193	0.0643	0	15317193
Government Office Building	0.0025	0	692170	0.0029	0	692170
Government (Civic Center)	0.0005	0	126477	0.0005	0	126477
Medical Office Building	0.0015	0	404843	0.0017	0	404843
Hospital	0.3961	80	1.09E+08	0.4206	80	1.09E+08
Warehouse	0.0013	0	346103	0.0015	0	346103
General Light Industry	0.0066	0	1823270	0.0076	0	1823270
Industrial Park	0.0035	0	970089	0.0041	0	970089
Mixed Use	0.0035	0	971442	0.0041	0	971442
Vehicle Repair	0.0021	0	589246	0.0025	0	589246
Vehicle Sales/Rental	0.002	0	552950	0.0023	0	552950
Govt Utilities	0.0021	0	565349	0.0024	0	565349
Stadium	0.0041	0	1124000	0.0047	0	1124000

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
1990

Percentages by Land Use

Land Use Type (units)	Total Vehicle Miles			
	% of square feet	Vehicle Miles	Ratio	Sq Ft
Single Family Housing	0.0756	2,406,846.34	1800	44809200
Apartments Low Rise	0.0544	1,731,718.95	1800	44715600
Condo/Townhouse General	0.0072	229,761.92	1800	5932800
Congregate Care Facility	0.001	30,795.15	80	120720
Day-Care Center	0.0024	77,516.56	0	107682
Elementary School	0.0038	120,723.79	40	388720
Junior High School	0.0005	15,288.59	40	39200
High School	0.0043	138,104.74	40	348680
Junior College (2 yr)	0.0042	134,668.04	40	494240
College/University (4 yr)	0.0019	61,303.97	40	113440
Library	0.0036	114,908.69	0	234286
Place of Worship	0.0039	124,152.26	0	1512638
City Park	0.0004	12,137.81	0	36612180
Racquet Club	0.0007	20,850.96	0	163260
Racquetball/Health	0.0002	7,680.55	0	25684
Quality Restaurant	0.0092	293,223.58	0	354644
Fast Food Rest. w/ drive-through	0.0085	270,332.61	0	41571
Hotel	0.0031	97,875.11	325	428675
Motel	0.001	33,084.00	325	210275
Free-standing discount store	0.0005	14,798.53	0	2943756
Regnl Shop Ctr.	0.0024	75,426.44	0	1957634
Strip Mall	0.0067	214,126.95	0	555738
Hardware/paint store	0.0006	20,337.35	0	44193
Supermarket	0.0074	236,074.39	0	257327
Convenience Market w/ gas pump	0.0074	235,593.99	0	31054
Bank (with drive-through)	0	0.00	0	134624
General Office Building	0.0539	1,716,356.69	0	15317193
Government Office Building	0.0139	442,044.97	0	692170
Government (Civic Center)	0.001	32,717.69	0	126477
Medical Office Building	0.0042	133,916.30	0	404843
Hospital	0.0074	234,725.07	80	108917280
Warehouse	0.0005	15,403.55	0	346103
General Light Industry	0.0043	136,295.36	0	1823270
Industrial Park	0.0022	70,318.59	0	970089
Mixed Use	0.0012	37,046.11	0	971442
Vehicle Repair	0.0024	76,137.69	0	589246
Vehicle Sales/Rental	0.0056	178,618.33	0	552950
Govt Utilities	0.0005	15,066.20	0	565349
Stadium	0.6919	22,023,326.80	0	1124000

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
1990

			lbs/MWh	lbs/MWh	lbs/MWh	Ratio
Generation by Plant	**1990**	**1990**	**1996**			
Plant	**adjusted**	**MWh**	**CO2**	**CH4**	**N2O**	
Intermountain (Utah)	1,320,170	718,441	2173	0.02519	0.03778	183.7548
Glenarm (Pasadena)	392,347	384,541	1207	0.024938	0.002494	102.03
Magnolia						
Purchase	6,048	6,048	1183	0.0067	0.0166	100

Emission ratios were different for each of the power plants and regional combined used for purchased. A ratio was used to convert all MWh used to a base of the regional combined ration of 1183.

APPENDIX B: ASSUMPTIONS 2007

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2007

Land Use Type (units)	Natural gas usage rate from EIA (MMBTU/year)	Kilowatt-hour/ year	Potable Water Usage (gallons/year)	Solid Waste (lbs/year)
Single Family Housing	800972.6712	312014240.7	1299400891	87624761.6
Apartments Low Rise	872933.2224	340046054.4	1416816635	97417740.8
Condo/Townhouse General	170259.6048	66323637.77	275709559.9	23170316.8
Congregate Care Facility	2821.9824	1099286.814	4348731.229	384038.4
Day-Care Center	2351.652	916072.3448	3478984.984	320032
Elementary School	9406.608	3664289.379	15655432.43	1280128
Junior High School	940.6608	366428.9379	1739492.492	128012.8
High School	8465.9472	3297860.441	13915939.93	1152115.2
Junior College (2 yr)	21635.1984	8427865.573	34789849.84	2944294.4
College/University (4 yr)	5173.6344	2015359.159	7827716.213	704070.4
Library	4703.304	1832144.69	7827716.213	640064
Place of Worship	30101.1456	11725726.01	48705789.77	4096409.6
City Park		18321446.9	1062829912	64006400
Racquet Club	3292.3128	1282501.283	5218477.475	448044.8
Racquetball/Health	470.3304	183214.469	869746.2459	64006.4
Quality Restaurant	7054.956	2748217.035	11306701.2	960096
Fast Food Rest. w/ drive-through	940.6608	366428.9379	1739492.492	128012.8
Hotel	9876.9384	3847503.848	15655432.43	1344134.4
Motel	4232.9736	1648930.221	6957969.967	576057.6
Free-standing discount store	58320.9696	22718594.15	94802340.8	7936793.6
Regnl Shop Ctr.	38567.0928	15023586.46	62621729.7	5248524.8
Strip Mall	9876.9384	3847503.848	17394924.92	1472147.2
Hardware/paint store	940.6608	366428.9379	1739492.492	128012.8
Supermarket	5173.6344	2015359.159	8697462.459	704070.4
Convenience Market w/ gas pump	470.3304	183214.469	869746.2459	64006.4
Bank (with drive-through)	2821.9824	1099286.814	4348731.229	384038.4
General Office Building	303363.108	118173332.5	492276375.2	41284128
Government Office Building	13639.5816	5313219.6	22613402.39	1856185.6
Government (Civic Center)	2351.652	916072.3448	4348731.229	320032
Medical Office Building	7995.6168	3114645.972	13046193.69	1088108.8
Hospital	2155524.223	821350464.4	3498989147	271963193.6
Warehouse	6114.2952	2381788.097	10436954.95	832083.2
General Light Industry	36215.4408	14107514.11	58272998.47	4928492.8
Industrial Park	19283.5464	7511793.228	31310864.85	2624262.4
Mixed Use	19283.5464	7511793.228	31310864.85	2624262.4
Vehicle Repair	11758.26	4580361.724	19134417.41	1600160
Vehicle Sales/Rental	10817.5992	4213932.786	17394924.92	1472147.2
Govt Utilities	11287.9296	4397147.255	18264671.16	1536153.6
Stadium	33863.7888	13191441.77	54794013.49	4608460.8

All Electric, Natural Gas, Potable Water and Solid Waste were determined as a percentage of total annual city usage based on land use type. City Park percentages were augmented to provide a more accurate account of actual park usages.

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2007

Consumption Totals

	Natural Gas (MMBTU/year)	Electric (kWh/year)	Potable Water (gallons/year)	Solid Waste (lbs/year)
Total Annual Consumption		1,832,144,689.69		
Natural Gas Fired Plants		123,310,021.48		
Intermountain Coal Fired (Utah)		1,469,426,668.21		
Purchased		239,408,000.00		
Natural Gas	4,703,304.00			
Other Fuels				
Potable Water			8,697,462,458.90	
Solid Waste Disposal				640,064,000.00

Potable Water Production

		acre feet per year	conversion factor	gallons/ year
total acre feet/year	38683.38			
% from local wells	31	11991.8478	325851	3907555597
% purchased	69	26691.5322	325851	8697462459

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2007

Percentages by Land Use

Land Use Type (units)	Natural Gas			Electric		
	% of sq ft	Ratio of unit to SQFT	Square Feet	% of sq ft	Ratio of unit to SQFT	Square Feet
Single Family Housing	0.1703	1800	44775000	0.1703	1800	44775000
Apartments Low Rise	0.1856	1800	48810600	0.1856	1800	48810600
Condo/Townhouse General	0.0362	1800	9507600	0.0362	1800	9507600
Congregate Care Facility	0.0006	80	145520	0.0006	80	145520
Day-Care Center	0.0005		119161	0.0005		119161
Elementary School	0.002	40	536040	0.002	40	536040
Junior High School	0.0002	40	54040	0.0002	40	54040
High School	0.0018	40	480840	0.0018	40	480840
Junior College (2 yr)	0.0046	40	1212360	0.0046	40	1212360
College/University (4 yr)	0.0011	40	278240	0.0011	40	278240
Library	0.001		259262	0.001		259262
Place of Worship	0.0064		1673893	0.0064		1673893
City Park	0	0	0	0.01	0.01	36612180
Racquet Club	0.0007		181069	0.0007		181069
Racquetball/Health	0.0001		28422	0.0001		28422
Quality Restaurant	0.0015		392451	0.0015		392451
Fast Food Rest. w/ drive-through	0.0002		46003	0.0002		46003
Hotel	0.0021	325	542425	0.0021	325	542425
Motel	0.0009	325	240825	0.0009	325	240825
Free-standing discount store	0.0124		3257575	0.0124		3257575
Regnl Shop Ctr.	0.0082		2166328	0.0082		2166328
Strip Mall	0.0021		614983	0.0021		614983
Hardware/paint store	0.0002		48904	0.0002		48904
Supermarket	0.0011		284759	0.0011		284759
Convenience Market w/ gas pump	0.0001		34365	0.0001		34365
Bank (with drive-through)	0.0006		148976	0.0006		148976
General Office Building	0.0645		16950082	0.0645		16950082
Government Office Building	0.0029		765959	0.0029		765959
Government (Civic Center)	0.0005		139960	0.0005		139960
Medical Office Building	0.0017		448001	0.0017		448001
Hospital	0.4583	80	1.21E+08	0.4483	80	1.21E+08
Warehouse	0.0013		346103	0.0013		346103
General Light Industry	0.0077		2017640	0.0077		2017640
Industrial Park	0.0041		1073505	0.0041		1073505
Mixed Use	0.0041		1075002	0.0041		1075002
Vehicle Repair	0.0025		652062	0.0025		652062
Vehicle Sales/Rental	0.0023		611897	0.0023		611897
Govt Utilities	0.0024		625618	0.0024		625618
Stadium	0.0072		1900800	0.0072		1900800

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2007

Percentages by Land Use

Land Use Type (units)	Potable Water			Solid Waste		
	% of sq ft	Ratio of unit to SQFT	Square Feet	% of sq ft	Ratio of unit to SQFT	Square Feet
Single Family Housing	0.1494	1800	44775000	0.1369	1800	44775000
Apartments Low Rise	0.1629	1800	48810600	0.1522	1800	48810600
Condo/Townhouse General	0.0317	1800	9507600	0.0362	1800	9507600
Congregate Care Facility	0.0005	80	145520	0.0006	80	145520
Day-Care Center	0.0004		119161	0.0005		119161
Elementary School	0.0018	40	536040	0.002	40	536040
Junior High School	0.0002	40	54040	0.0002	40	54040
High School	0.0016	40	480840	0.0018	40	480840
Junior College (2 yr)	0.004	40	1212360	0.0046	40	1212360
College/University (4 yr)	0.0009	40	278240	0.0011	40	278240
Library	0.0009		259262	0.001		259262
Place of Worship	0.0056		1673893	0.0064		1673893
City Park	0.1222	0	36612180	0.1	0	36612180
Racquet Club	0.0006		181069	0.0007		181069
Racquetball/Health	0.0001		28422	0.0001		28422
Quality Restaurant	0.0013		392451	0.0015		392451
Fast Food Rest. w/ drive-through	0.0002		46003	0.0002		46003
Hotel	0.0018	325	542425	0.0021	325	542425
Motel	0.0008	325	240825	0.0009	325	240825
Free-standing discount store	0.0109		3257575	0.0124		3257575
Regnl Shop Ctr.	0.0072		2166328	0.0082		2166328
Strip Mall	0.002		614983	0.0023		614983
Hardware/paint store	0.0002		48904	0.0002		48904
Supermarket	0.001		284759	0.0011		284759
Convenience Market w/ gas pump	0.0001		34365	0.0001		34365
Bank (with drive-through)	0.0005		148976	0.0006		148976
General Office Building	0.0566		16950082	0.0645		16950082
Government Office Building	0.0026		765959	0.0029		765959
Government (Civic Center)	0.0005		139960	0.0005		139960
Medical Office Building	0.0015		448001	0.0017		448001
Hospital	0.4023	80	120528400	0.4249	80	120528400
Warehouse	0.0012		346103	0.0013		346103
General Light Industry	0.0067		2017640	0.0077		2017640
Industrial Park	0.0036		1073505	0.0041		1073505
Mixed Use	0.0036		1075002	0.0041		1075002
Vehicle Repair	0.0022		652062	0.0025		652062
Vehicle Sales/Rental	0.002		611897	0.0023		611897
Govt Utilities	0.0021		625618	0.0024		625618
Stadium	0.0063		1900800	0.0072		1900800

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2007

Percentages by Land Use

Land Use Type (units)	Total Vehicle Miles			
	% of square feet	Vehicle Miles	Ratio	Sq Ft
Single Family Housing	0.0727	2,405,009.35	1800	44775000
Apartments Low Rise	0.0572	1,890,307.65	1800	48810600
Condo/Townhouse General	0.0111	368,204.63	1800	9507600
Congregate Care Facility	0.0011	37,121.53	80	145520
Day-Care Center	0.0026	85,780.78	0	119161
Elementary School	0.005	166,476.59	40	536040
Junior High School	0.0006	21,076.41	40	54040
High School	0.0058	190,450.50	40	480840
Junior College (2 yr)	0.01	330,337.79	40	1212360
College/University (4 yr)	0.0045	150,363.33	40	6956
Library	0.0039	127,331.92	0	259262
Place of Worship	0.0042	137,387.10	0	1673893
City Park	0.0004	12,137.81	0	36612180
Racquet Club	0.0007	23,072.02	0	181069
Racquetball/Health	0.0003	8,500.04	0	28422
Quality Restaurant	0.0095	324,485.65	0	392451
Fast Food Rest. w/ drive-through	0.009	299,141.21	0	46003
Hotel	0.0037	123,846.51	325	542425
Motel	0.0011	37,890.65	325	240825
Free-standing discount store	0.0005	16,371.88	0	3257575
Regnl Shop Ctr.	0.0025	83,467.67	0	2166328
Strip Mall	0.0072	236,952.15	0	614983
Hardware/paint store	0.0007	22,505.01	0	48904
Supermarket	0.0079	261,238.68	0	284759
Convenience Market w/ gas pump	0.0079	260,708.85	0	34365
Bank (with drive-through)	0	0.00	0	148976
General Office Building	0.0574	1,899,328.96	0	16950082
Government Office Building	0.0148	489,169.98	0	765959
Government (Civic Center)	0.0011	36,204.69	0	139960
Medical Office Building	0.0045	148,193.12	0	448001
Hospital	0.0079	259,746.30	80	120528400
Warehouse	0.0005	17,045.38	0	346103
General Light Industry	0.0046	150,825.14	0	2017640
Industrial Park	0.0024	77,815.16	0	1073505
Mixed Use	0.0012	40,995.39	0	1075002
Vehicle Repair	0.0025	84,258.61	0	652062
Vehicle Sales/Rental	0.006	197,660.83	0	611897
Govt Utilities	0.0005	16,672.65	0	625618
Stadium	0.6661	22,023,326.80	0	1900800

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2007

			lbs/MWh	lbs/MWh	lbs/MWh	Ratio
Generation by Plant	**2007**	**2007**	**2007**			
Plant	**adjusted**	**MWh**	**CO2**	**CH4**	**N2O**	
Intermountain (Utah)	1,469,427	779,977	2228	0.02519	0.03778	188.3936
Glenarm (Pasadena)	59,427	50,499	1392	0.024938	0.002494	117.6794
Magnolia	63,883	89,852	841	0.126032	0.012603	71.09814
Purchase	239,408	239,408	1182	0.0067	0.0037	100

Emission ratios were different for each of the power plants and regional combined used for purchased.
A ratio was used to convert all MWh used to a base of the regional combined ration of 1182.

APPENDIX B: ASSUMPTIONS 2020 UNMITIGATED

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020

Land Use Type (units)	Natural gas usage rate from EIA (MMBTU/year)	Kilowatt-hour/ year	Potable Water Usage (gallons/year)	Solid Waste (lbs/year)
Single Family Housing	935504.803	283423899.6	1517631096	108709269.8
Apartments Low Rise	1019705.703	308933707.1	1654126898	120168015.6
Condo/Townhouse General	198473.5497	60130260.41	322534523.5	27009900.72
Congregate Care Facility	3280.55454	993888.6018	5055400.054	446444.64
Day-Care Center	2733.79545	828240.5015	4044320.043	372037.2
Elementary School	10935.1818	3312962.006	18199440.2	1488148.8
Junior High School	1093.51818	331296.2006	2022160.022	148814.88
High School	9841.66362	2981665.805	16177280.17	1339333.92
Junior College (2 yr)	25150.91814	7619812.614	41454280.44	3422742.24
College/University (4 yr)	6014.34999	1822129.103	9099720.098	818481.84
Library	5467.5909	1656481.003	9099720.098	744074.4
Place of Worship	34992.58176	10601478.42	56620480.61	4762076.16
City Park	0	16564810.03	1240595173	74407440
Racquet Club	3827.31363	1159536.702	6066480.065	520852.08
Racquetball/Health	546.75909	165648.1003	1011080.011	74407.44
Quality Restaurant	8201.38635	2484721.505	13144040.14	1116111.6
Fast Food Rest. w/ drive-through	1093.51818	331296.2006	2022160.022	148814.88
Hotel	11481.94089	3478610.106	18199440.2	1562556.24
Motel	4920.83181	1490832.903	8088640.087	669666.96
Free-standing discount store	66704.60898	20540364.44	110207721.2	9226522.56
Regnl Shop Ctr.	45381.00447	13748792.33	73808840.79	6175817.52
Strip Mall	13122.21816	3809906.307	19210520.21	1785778.56
Hardware/paint store	1093.51818	331296.2006	2022160.022	148814.88
Supermarket	6014.34999	1822129.103	10110800.11	818481.84
Convenience Market w/ gas pump	546.75909	165648.1003	1011080.011	74407.44
Bank (with drive-through)	3280.55454	993888.6018	5055400.054	446444.64
General Office Building	354299.8903	107339969	574293446.2	48216021.12
Government Office Building	15856.01361	4803794.909	26288080.28	2157815.76
Government (Civic Center)	2733.79545	828240.5015	5055400.054	372037.2
Medical Office Building	9294.90453	2816017.705	15166200.16	1264926.48
Hospital	2518372.369	746244691.9	4084763244	305368133.8
Warehouse	7107.86817	2153425.304	12132960.13	967296.72
General Light Industry	42100.44993	12754903.72	68753440.74	5729372.88
Industrial Park	22417.12269	6791572.112	36398880.39	3050705.04
Mixed Use	22417.12269	6791572.112	36398880.39	3050705.04
Vehicle Repair	13668.97725	4141202.508	22243760.24	1860186
Vehicle Sales/Rental	12575.45907	3809906.307	21232680.23	1711371.12
Govt Utilities	13122.21816	3975554.407	21232680.23	1785778.56
Stadium	12575.45907	3809906.307	20221600.22	1711371.12

All Electric, Natural Gas, Potable Water and Solid Waste were determined as a percentage of total annual city usage based on land use type. City Park percentages were augmented to provide a more accurate account of actual park usages.

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020

Consumption Totals

	Natural Gas (MMBTU/year)	Electric (kWh/year)	Potable Water (gallons/year)	Solid Waste (lbs/year)
Total Annual Consumption		1,656,481,003.04		
Natural Gas Fired Plants		122,222,269.19		
Intermountain Coal Fired (Utah)		1,469,440,733.85		
Purchased		64,818,000.00		
Natural Gas	5,467,590.90			
Other Fuels				
Potable Water			10,110,800,108.47	
Solid Waste Disposal				744,074,400.00

Assumed 1.25% increase per year between 2007 and 2020, therefore 1.1525% increase over 2007 levels.

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020

Percentages by Land Use

Land Use Type (units)	Natural Gas			Electric		
	% of sq ft	Ratio of unit to SQFT	Square Feet	% of sq ft	Ratio of unit to SQFT	Square Feet
Single Family Housing	0.1711	1800	52050942	0.1711	1800	52050942
Apartments Low Rise	0.1865	1800	56742318	0.1865	1800	56742318
Condo/Townhouse General	0.0363	1800	11052594	0.0363	1800	11052594
Congregate Care Facility	0.0006	80	169167.2	0.0006	80	169167.2
Day-Care Center	0.0005	0	138540	0.0005	0	138540
Elementary School	0.002	40	623120	0.002	40	623120
Junior High School	0.0002	40	62840	0.0002	40	62840
High School	0.0018	40	558960	0.0018	40	558960
Junior College (2 yr)	0.0046	40	1409360	0.0046	40	1409360
College/University (4 yr)	0.0011	40	323440	0.0011	40	323440
Library	0.001	0	301390	0.001	0	301390
Place of Worship	0.0064	0	1945900	0.0064	0	1945900
City Park	0	0	0	0.01	0.01	42561605
Racquet Club	0.0007	0	210490	0.0007	0	210490
Racquetball/Health	0.0001	0	33040	0.0001	0	33040
Quality Restaurant	0.0015	0	456240	0.0015	0	456240
Fast Food Rest. w/ drive-through	0.0002	0	53480	0.0002	0	53480
Hotel	0.0021	325	630500	0.0021	325	630500
Motel	0.0009	325	279825	0.0009	325	279825
Free-standing discount store	0.0122	0	3786930	0.0124	0	3786930
Regnl Shop Ctr.	0.0083	0	2518360	0.0083	0	2518360
Strip Mall	0.0024	0	714920	0.0023	0	714920
Hardware/paint store	0.0002	0	56850	0.0002	0	56850
Supermarket	0.0011	0	331030	0.0011	0	331030
Convenience Market w/ gas pump	0.0001	0	39950	0.0001	0	39950
Bank (with drive-through)	0.0006	0	173180	0.0006	0	173180
General Office Building	0.0648	0	19704470	0.0648	0	19704470
Government Office Building	0.0029	0	890430	0.0029	0	890430
Government (Civic Center)	0.0005	0	162700	0.0005	0	162700
Medical Office Building	0.0017	0	520800	0.0017	0	520800
Hospital	0.4606	80	1.4E+08	0.4505	80	1.4E+08
Warehouse	0.0013	0	402340	0.0013	0	402340
General Light Industry	0.0077	0	2345510	0.0077	0	2345510
Industrial Park	0.0041	0	1247950	0.0041	0	1247950
Mixed Use	0.0041	0	1249690	0.0041	0	1249690
Vehicle Repair	0.0025	0	758020	0.0025	0	758020
Vehicle Sales/Rental	0.0023	0	711330	0.0023	0	711330
Govt Utilities	0.0024	0	727280	0.0024	0	727280
Stadium	0.0023	0	701257	0.0023	0	701257

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020

Percentages by Land Use

Land Use Type (units)	Potable Water			Solid Waste		
	% of sq ft	Ratio of unit to SQFT	Square Feet	% of sq ft	Ratio of unit to SQFT	Square Feet
Single Family Housing	0.1501	1800	52050942	0.1461	1800	52050942
Apartments Low Rise	0.1636	1800	56742318	0.1615	1800	56742318
Condo/Townhouse General	0.0319	1800	11052594	0.0363	1800	11052594
Congregate Care Facility	0.0005	80	169167.2	0.0006	80	169167.2
Day-Care Center	0.0004	0	138540	0.0005	0	138540
Elementary School	0.0018	40	623120	0.002	40	623120
Junior High School	0.0002	40	62840	0.0002	40	62840
High School	0.0016	40	558960	0.0018	40	558960
Junior College (2 yr)	0.0041	40	1409360	0.0046	40	1409360
College/University (4 yr)	0.0009	40	323440	0.0011	40	323440
Library	0.0009	0	301390	0.001	0	301390
Place of Worship	0.0056	0	1945900	0.0064	0	1945900
City Park	0.1227	0	42561604.8	0.1	0	42561604.8
Racquet Club	0.0006	0	210490	0.0007	0	210490
Racquetball/Health	0.0001	0	33040	0.0001	0	33040
Quality Restaurant	0.0013	0	456240	0.0015	0	456240
Fast Food Rest. w/ drive-through	0.0002	0	53480	0.0002	0	53480
Hotel	0.0018	325	630500	0.0021	325	630500
Motel	0.0008	325	279825	0.0009	325	279825
Free-standing discount store	0.0109	0	3786930	0.0124	0	3786930
Regnl Shop Ctr.	0.0073	0	2518360	0.0083	0	2518360
Strip Mall	0.0019	0	714920	0.0024	0	714920
Hardware/paint store	0.0002	0	56850	0.0002	0	56850
Supermarket	0.001	0	331030	0.0011	0	331030
Convenience Market w/ gas pump	0.0001	0	39950	0.0001	0	39950
Bank (with drive-through)	0.0005	0	173180	0.0006	0	173180
General Office Building	0.0568	0	19704470	0.0648	0	19704470
Government Office Building	0.0026	0	890430	0.0029	0	890430
Government (Civic Center)	0.0005	0	162700	0.0005	0	162700
Medical Office Building	0.0015	0	520800	0.0017	0	520800
Hospital	0.404	80	140113600	0.4104	80	140113600
Warehouse	0.0012	0	402340	0.0013	0	402340
General Light Industry	0.0068	0	2345510	0.0077	0	2345510
Industrial Park	0.0036	0	1247950	0.0041	0	1247950
Mixed Use	0.0036	0	1249690	0.0041	0	1249690
Vehicle Repair	0.0022	0	758020	0.0025	0	758020
Vehicle Sales/Rental	0.0021	0	711330	0.0023	0	711330
Govt Utilities	0.0021	0	727280	0.0024	0	727280
Stadium	0.002	0	701257	0.0023	0	701257

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020

Percentages by Land Use

Land Use Type (units)	Total Vehicle Miles			
	% of square feet	Vehicle Miles	Ratio	Sq Ft
Single Family Housing	0.0744	2,795,823.55	1800	52050942
Apartments Low Rise	0.0584	2,197,482.46	1800	56742318
Condo/Townhouse General	0.0114	428,038.24	1800	11052594
Congregate Care Facility	0.0011	43,153.83	80	169167.2
Day-Care Center	0.0027	99,732.02	0	138540
Elementary School	0.0051	193,520.81	40	623120
Junior High School	0.0007	24,508.54	40	62840
High School	0.0059	221,392.18	40	558960
Junior College (2 yr)	0.0102	384,015.37	40	1409360
College/University (4 yr)	0.0046	174,789.81	40	323440
Library	0.0039	147,818.23	0	301390
Place of Worship	0.0042	159,712.74	0	1945900
City Park	0.0004	14,110.18	0	42561604.8
Racquet Club	0.0007	26,822.21	0	210490
Racquetball/Health	0.0003	9,881.83	0	33040
Quality Restaurant	0.01	377,228.51	0	456240
Fast Food Rest. w/ drive-through	0.0092	347,784.17	0	53480
Hotel	0.0038	143,955.80	325	630500
Motel	0.0012	44,026.78	325	279825
Free-standing discount store	0.0506	1,903,566.39	0	3786930
Regnl Shop Ctr.	0.0258	970,325.64	0	2518360
Strip Mall	0.0073	275,459.09	0	714920
Hardware/paint store	0.0007	26,163.80	0	56850
Supermarket	0.0081	303,686.74	0	331030
Convenience Market w/ gas pump	0.0081	303,123.36	0	39950
Bank (with drive-through)	0	0.00	0	173180
General Office Building	0.0587	2,207,970.20	0	19704470
Government Office Building	0.0151	568,661.03	0	890430
Government (Civic Center)	0.0011	42,087.04	0	162700
Medical Office Building	0.0046	172,274.50	0	520800
Hospital	0.008	301,954.66	80	140113600
Warehouse	0.0005	17,906.58	0	402340
General Light Industry	0.0047	175,334.49	0	2345510
Industrial Park	0.0024	90,459.72	0	1247950
Mixed Use	0.0013	47,657.24	0	1249690
Vehicle Repair	0.0026	97,944.67	0	758020
Vehicle Sales/Rental	0.0061	229,779.50	0	711330
Govt Utilities	0.0005	19,381.87	0	727280
Stadium	0.5855	22,023,326.80	0	701257

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020

				lbs/MWh	lbs/MWh	lbs/MWh	Ratio
Generation by Plant	**2020**			**2005**			
Plant	**adjusted**	**2020 MWh**	**2007MWh**	**CO2**	**CH4**	**N2O**	
Intermountain (Utah)	1,469,441	780,000	779,977	2228	0.02519	0.03778	188.3898
Glenarm (Pasadena)	58,839	50,000	50,499	1392	0.024938	0.002494	117.6775
Magnolia	63,383	85,000	89852	882	0.126032	0.012603	74.56882
Purchase	64,818	64,818	263886	1183	0.0067	0.0037	100

Emission ratios were different for each of the power plants and regional combined used for purchased. A ratio was used to convert all MWh used to a base of the regional combined ration of 1183

APPENDIX B: ASSUMPTIONS 2020 MITIGATED

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020 With IRP

Land Use Type (units)	Natural gas usage rate from EIA (MMBTU/year)	Kilowatt-hour/ year	Potable Water Usage (gallons/year)	Solid Waste (lbs/year)
Single Family Housing	935504.803	173198017.1	1517631096	108709269.8
Apartments Low Rise	1019705.703	188786850.9	1654126898	120168015.6
Condo/Townhouse General	198473.5497	36745108.25	322534523.5	27009900.72
Congregate Care Facility	3280.55454	607357.1612	5055400.054	446444.64
Day-Care Center	2733.79545	506130.9677	4044320.043	372037.2
Elementary School	10935.1818	2024523.871	18199440.2	1488148.8
Junior High School	1093.51818	202452.3871	2022160.022	148814.88
High School	9841.66362	1822071.484	16177280.17	1339333.92
Junior College (2 yr)	25150.91814	4656404.903	41454280.44	3422742.24
College/University (4 yr)	6014.34999	1113488.129	9099720.098	818481.84
Library	5467.5909	1012261.935	9099720.098	744074.4
Place of Worship	34992.58176	6478476.386	56620480.61	4762076.16
City Park	0	10122619.35	1240595173	74407440
Racquet Club	3827.31363	708583.3547	6066480.065	520852.08
Racquetball/Health	546.75909	101226.1935	1011080.011	74407.44
Quality Restaurant	8201.38635	1518392.903	13144040.14	1116111.6
Fast Food Rest. w/ drive-through	1093.51818	202452.3871	2022160.022	148814.88
Hotel	11481.94089	2125750.064	18199440.2	1562556.24
Motel	4920.83181	911035.7418	8088640.087	669666.96
Free-standing discount store	66704.60898	12552048	110207721.2	9226522.56
Regnl Shop Ctr.	45381.00447	8401774.063	73808840.79	6175817.52
Home Improvement Superstore	0	0	0	0
Strip Mall	13122.21816	2328202.451	19210520.21	1785778.56
Hardware/paint store	1093.51818	202452.3871	2022160.022	148814.88
Supermarket	6014.34999	1113488.129	10110800.11	818481.84
Convenience Market w/ gas pump	546.75909	101226.1935	1011080.011	74407.44
Bank (with drive-through)	3280.55454	607357.1612	5055400.054	446444.64
General Office Building	354299.8903	65594573.41	574293446.2	48216021.12
Government Office Building	15856.01361	2935559.613	26288080.28	2157815.76
Government (Civic Center)	2733.79545	506130.9677	5055400.054	372037.2
Medical Office Building	9294.90453	1720845.29	15166200.16	1264926.48
Hospital	2518372.369	456024001.9	4084763244	305368133.8
Warehouse	7107.86817	1315940.516	12132960.13	967296.72
General Light Industry	42100.44993	7794416.902	68753440.74	5729372.88
Industrial Park	22417.12269	4150273.935	36398880.39	3050705.04
Mixed Use	22417.12269	4150273.935	36398880.39	3050705.04
Vehicle Repair	13668.97725	2530654.838	22243760.24	1860186
Vehicle Sales/Rental	12575.45907	2328202.451	21232680.23	1711371.12
Govt Utilities	13122.21816	2429428.645	21232680.23	1785778.56
Stadium	12575.45907	2328202.451	20221600.22	1711371.12

All Electric, Natural Gas, Potable Water and Solid Waste were determined as a percentage of total annual city usage based on land use type. City Park percentages were augmented to provide a more accurate account of actual park usages.

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020 With IRP

Consumption Totals 2020 With IRP

	Natural Gas (MMBTU/year)	Electric (kWh/year)	Potable Water (gallons/year)	Solid Waste (lbs/year)
Total Annual Consumption		1,012,261,935.35		
Natural Gas Fired Plants		125,762,876.22		
Intermountain Coal Fired (Utah)		855,029,059.14		
Purchased		31,470,000.00		
Natural Gas	5,467,590.90			
Other Fuels				
Potable Water			10,110,800,108.47	
Solid Waste Disposal				744,074,400.00

Assumed 1.25% increase per year between 2007 and 2020, therefore 1.1525% increase over 2007 levels.

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020 With IRP

Percentages by Land Use

Land Use Type (units)	Natural Gas			Electric		
	% of sq ft	Ratio of unit to SQFT	Square Feet	% of sq ft	Ratio of unit to SQFT	Square Feet
Single Family Housing	0.1711	1800	52050942	0.1711	1800	52050942
Apartments Low Rise	0.1865	1800	56742318	0.1865	1800	56742318
Condo/Townhouse General	0.0363	1800	11052594	0.0363	1800	11052594
Congregate Care Facility	0.0006	80	169167.2	0.0006	80	169167.2
Day-Care Center	0.0005	0	138540	0.0005	0	138540
Elementary School	0.002	40	623120	0.002	40	623120
Junior High School	0.0002	40	62840	0.0002	40	62840
High School	0.0018	40	558960	0.0018	40	558960
Junior College (2 yr)	0.0046	40	1409360	0.0046	40	1409360
College/University (4 yr)	0.0011	40	323440	0.0011	40	323440
Library	0.001	0	301390	0.001	0	301390
Place of Worship	0.0064	0	1945900	0.0064	0	1945900
City Park	0	0	0	0.01	0.01	42561605
Racquet Club	0.0007	0	210490	0.0007	0	210490
Racquetball/Health	0.0001	0	33040	0.0001	0	33040
Quality Restaurant	0.0015	0	456240	0.0015	0	456240
Fast Food Rest. w/ drive-through	0.0002	0	53480	0.0002	0	53480
Hotel	0.0021	325	630500	0.0021	325	630500
Motel	0.0009	325	279825	0.0009	325	279825
Free-standing discount store	0.0122	0	3786930	0.0124	0	3786930
Regnl Shop Ctr.	0.0083	0	2518360	0.0083	0	2518360
Home Improvement Superstore	0	0	11860	0	0	11860
Strip Mall	0.0024	0	714920	0.0023	0	714920
Hardware/paint store	0.0002	0	56850	0.0002	0	56850
Supermarket	0.0011	0	331030	0.0011	0	331030
Convenience Market w/ gas pump	0.0001	0	39950	0.0001	0	39950
Bank (with drive-through)	0.0006	0	173180	0.0006	0	173180
General Office Building	0.0648	0	19704470	0.0648	0	19704470
Government Office Building	0.0029	0	890430	0.0029	0	890430
Government (Civic Center)	0.0005	0	162700	0.0005	0	162700
Medical Office Building	0.0017	0	520800	0.0017	0	520800
Hospital	0.4606	80	140113600	0.4505	80	1.4E+08
Warehouse	0.0013	0	402340	0.0013	0	402340
General Light Industry	0.0077	0	2345510	0.0077	0	2345510
Industrial Park	0.0041	0	1247950	0.0041	0	1247950
Mixed Use	0.0041	0	1249690	0.0041	0	1249690
Vehicle Repair	0.0025	0	758020	0.0025	0	758020
Vehicle Sales/Rental	0.0023	0	711330	0.0023	0	711330
Govt Utilities	0.0024	0	727280	0.0024	0	727280
Stadium	0.0023	0	701257	0.0023	0	701257

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020 With IRP

Percentages by Land Use

Land Use Type (units)	Potable Water			Solid Waste		
	% of sq ft	Ratio of unit to SQFT	Square Feet	% of sq ft	Ratio of unit to SQFT	Square Feet
Single Family Housing	0.1501	1800	52050942	0.1461	1800	52050942
Apartments Low Rise	0.1636	1800	56742318	0.1615	1800	56742318
Condo/Townhouse General	0.0319	1800	11052594	0.0363	1800	11052594
Congregate Care Facility	0.0005	80	169167.2	0.0006	80	169167.2
Day-Care Center	0.0004	0	138540	0.0005	0	138540
Elementary School	0.0018	40	623120	0.002	40	623120
Junior High School	0.0002	40	62840	0.0002	40	62840
High School	0.0016	40	558960	0.0018	40	558960
Junior College (2 yr)	0.0041	40	1409360	0.0046	40	1409360
College/University (4 yr)	0.0009	40	323440	0.0011	40	323440
Library	0.0009	0	301390	0.001	0	301390
Place of Worship	0.0056	0	1945900	0.0064	0	1945900
City Park	0.1227	0	42561604.8	0.1	0	42561605
Racquet Club	0.0006	0	210490	0.0007	0	210490
Racquetball/Health	0.0001	0	33040	0.0001	0	33040
Quality Restaurant	0.0013	0	456240	0.0015	0	456240
Fast Food Rest. w/ drive-through	0.0002	0	53480	0.0002	0	53480
Hotel	0.0018	325	630500	0.0021	325	630500
Motel	0.0008	325	279825	0.0009	325	279825
Free-standing discount store	0.0109	0	3786930	0.0124	0	3786930
Regnl Shop Ctr.	0.0073	0	2518360	0.0083	0	2518360
Home Improvement Superstore	0	0	11860	0	0	11860
Strip Mall	0.0019	0	714920	0.0024	0	714920
Hardware/paint store	0.0002	0	56850	0.0002	0	56850
Supermarket	0.001	0	331030	0.0011	0	331030
Convenience Market w/ gas pump	0.0001	0	39950	0.0001	0	39950
Bank (with drive-through)	0.0005	0	173180	0.0006	0	173180
General Office Building	0.0568	0	19704470	0.0648	0	19704470
Government Office Building	0.0026	0	890430	0.0029	0	890430
Government (Civic Center)	0.0005	0	162700	0.0005	0	162700
Medical Office Building	0.0015	0	520800	0.0017	0	520800
Hospital	0.404	80	140113600.00	0.4104	80	1.4E+08
Warehouse	0.0012	0	402340	0.0013	0	402340
General Light Industry	0.0068	0	2345510	0.0077	0	2345510
Industrial Park	0.0036	0	1247950	0.0041	0	1247950
Mixed Use	0.0036	0	1249690	0.0041	0	1249690
Vehicle Repair	0.0022	0	758020	0.0025	0	758020
Vehicle Sales/Rental	0.0021	0	711330	0.0023	0	711330
Govt Utilities	0.0021	0	727280	0.0024	0	727280
Stadium	0.002	0	701257	0.0023	0	701257

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020 With IRP

Percentages by Land Use

Land Use Type (units)	Total Vehicle Miles			
	% of square feet	Vehicle Miles	Ratio	Sq Ft
Single Family Housing	0.0744	2,795,823.55	1800	52050942
Apartments Low Rise	0.0584	2,197,482.46	1800	56742318
Condo/Townhouse General	0.0114	428,038.24	1800	11052594
Congregate Care Facility	0.0011	43,153.83	80	169167.2
Day-Care Center	0.0027	99,732.02	0	138540
Elementary School	0.0051	193,520.81	40	623120
Junior High School	0.0007	24,508.54	40	62840
High School	0.0059	221,392.18	40	558960
Junior College (2 yr)	0.0102	384,015.37	40	1409360
College/University (4 yr)	0.0046	174,789.81	40	323440
Library	0.0039	147,818.23	0	301390
Place of Worship	0.0042	159,712.74	0	1945900
City Park	0.0004	14,110.18	0	42561604.8
Racquet Club	0.0007	26,822.21	0	210490
Racquetball/Health	0.0003	9,881.83	0	33040
Quality Restaurant	0.01	377,228.51	0	456240
Fast Food Rest. w/ drive-through	0.0092	347,784.17	0	53480
Hotel	0.0038	143,955.80	325	630500
Motel	0.0012	44,026.78	325	279825
Free-standing discount store	0.0506	1,903,566.39	0	3786930
Regnl Shop Ctr.	0.0258	970,325.64	0	2518360
Home Improvement Superstore	0.0001	3,171.31	0	11860
Strip Mall	0.0073	275,459.09	0	714920
Hardware/paint store	0.0007	26,163.80	0	56850
Supermarket	0.0081	303,686.74	0	331030
Convenience Market w/ gas pump	0.0081	303,123.36	0	39950
Bank (with drive-through)	0	0.00	0	173180
General Office Building	0.0587	2,207,970.20	0	19704470
Government Office Building	0.0151	568,661.03	0	890430
Government (Civic Center)	0.0011	42,087.04	0	162700
Medical Office Building	0.0046	172,274.50	0	520800
Hospital	0.008	301,954.66	80	140113600
Warehouse	0.0005	17,906.58	0	402340
General Light Industry	0.0047	175,334.49	0	2345510
Industrial Park	0.0024	90,459.72	0	1247950
Mixed Use	0.0013	47,657.24	0	1249690
Vehicle Repair	0.0026	97,944.67	0	758020
Vehicle Sales/Rental	0.0061	229,779.50	0	711330
Govt Utilities	0.0005	19,381.87	0	727280
Stadium	0.5855	22,023,326.80	0	701257

Pasadena GHG Reduction Plan
Input data for Green House Gas Emissions
2020 with IRP Reductions

				lbs/MWh	lbs/MWh	lbs/MWh	Ratio
Generation by Plant	**2020**			**2005**			
Plant	**adjusted**	**2020 MWh**	**2007MWh**	**CO2**	**CH4**	**N2O**	
Intermountain (Utah)	855,029	467,986	779,977	2161	0.02519	0.03778	182.704
Glenarm (Pasadena)	62,374	60,831	50,499	1213	0.024938	0.002494	102.5366
Magnolia	63,389	85,000	89,852	882	0.126032	0.012603	74.57512
Purchase	31,470	31,470	239,408	1183	0.0067	0.0037	100

Emission ratios were different for each of the power plants and regional combined used for purchased. A ratio was used to convert all MWh used to a base of the regional combined ratio of 1183

2007

Recycled Material Assumptions			
%	Material	lb/yd	Compressed lbs/yd
40	Mixed Paper/Cardboard	500	200
20	HDPE (dairy only) Plastic	24	12
10	Aluminum Cans (crushed)	250	25
10	PET Plastic Soda Bottles	40	4
10	Mixed Other Plastic	50	5
10	Other Materials	500	54

≈300 lbs/yd = 10 compressed tons/truckload

30 cubic yds/truckload

20 miles roundtrip per truckload

2007 inventory = 334,047 tons = 33,405 truckloads = 668,100 VMT

Green Waste Assumptions		
%	Material	lb/yd
25%	Food waste	800
25%	Biosolids	800
16.67%	Yard trimmings (branches)	350
16.67%	Yard trimmings (grass)	350
16.66%	Yard trimmings (leaves)	350

Greenwaste Truck = 20 Cubic Yard Capacity

6 Tons greenwaste/truckload

50 miles roundtrip per truckload

2007 inventory = 1556 tons = 260 truckloads = 13000 VMT

2020 BAU

Recycled Material Assumptions			
%	Material	lb/yd	Compressed lbs/yd
40	Mixed Paper/Cardboard	500	200
20	HDPE (dairy only) Plastic	24	12
10	Aluminum Cans (crushed)	250	25
10	PET Plastic Soda Bottles	40	4
10	Mixed Other Plastic	50	5
10	Other Materials	500	54

≈300 lbs/yd = 10 compressed tons/truckload

30 cubic yds/truckload

2.4 Tons recyclyables/truckload

20 miles roundtrip per truckload

2020 inventory = 371.6 tons = 37,160.00 truckloads = 1,159,392.05 VMT

Green Waste Assumptions		
%	Material	lb/yd
25%	Food waste	800
25%	Biosolids	800
16.67%	Yard trimmings (branches)	350
16.67%	Yard trimmings (grass)	350
16.66%	Yard trimmings (leaves)	350

Greenwaste Truck = 20 Cubic Yard Capacity

6 Tons greenwaste/truckload

120 miles roundtrip per truckload

BAU 2020 inventory = 1734 tons = 289 truckloads = 9,197.14 VMT

2020 With Programs

Recycled Material Assumptions			
%	Material	lb/yd	Compressed lbs/yd
40	Mixed Paper/Cardboard	500	200
20	HDPE (dairy only) Plastic	24	12
10	Aluminum Cans (crushed)	250	25
10	PET Plastic Soda Bottles	40	4
10	Mixed Other Plastic	50	5
10	Other Materials	500	54

≈300 lbs/yd = 10 compressed tons/truckload

30 cubic yds/truckload

2.4 Tons recyclyables/truckload

20 miles roundtrip per truckload

2020 with programs inventory = 466.15 tons =194.23 truckloads = 792,518.34VMT

Green Waste Assumptions		
%	Material	lb/yd
25%	Food waste	800
25%	Biosolids	800
16.67%	Yard trimmings (branches)	350
16.67%	Yard trimmings (grass)	350
16.66%	Yard trimmings (leaves)	350

Greenwaste Truck = 20 Cubic Yard Capacity

6 Tons greenwaste/truckload

120 miles roundtrip per truckload

2020 with programs inventory = 867.00 tons = 144.5 truckloads = 3,006.76 VMT

Model Adjustments for Unspecified Land Use Reference:

Mixed Use, County of San Diego Transportation Impact Fee Program Trip Generation Rates, http://www.sdcounty.ca.gov/dpw/land/landpdf/transimpactfee/tripgen.pdf, Mixed Use: Commercial/Residential

Vehicle Repair, County of San Diego Transportation Impact Fee Program Trip Generation Rates, http://www.sdcounty.ca.gov/dpw/land/landpdf/transimpactfee/tripgen.pdf,

Vehicle Sales/Rental, County of San Diego Transportation Impact Fee Program Trip Generation Rates, http://www.sdcounty.ca.gov/dpw/land/landpdf/transimpactfee/tripgen.pdf,Sales (Dealer & Repair)

Govt Utilities, Institute of Transportation Engineers 7th Edition, General Office Building Range of Rates 1.59-7.28

Stadium, Rose Bowl Operating Company, Jess Waiters, CFE, March 2, 2009

2008 Event Attendance Numbers		
DATE	**EVENT**	**ATTENDANCE**
January		
1-Jan	Rose Bowl Game	84,267
13-Jan	RG Canning Flea Market	9,413
February		
10-Feb	RG Canning Flea Market	13,205
March		
1-Mar	USMC Color Detachment, Drum & Bugle Corps and Silent Drill	3,000
9-Mar	RG Canning Flea Market	13,052
April		
13-Apr	RG Canning Flea Market	10,625
May		
11-May	RG Canning Flea Market	9480
June		
8-Jun	RG Canning Flea Market	9,654
	PUSD High School Graduations	5,118
July		
4-Jul	Americafest 4th of July Celebration	23,128
13-Jul	RG Canning Flea Market	9,233
August		
10-Aug	RG Canning Flea Market	8,965
September		
1-Sep	UCLA Football vs. Tennessee	62,414
14-Sep	RG Canning Flea Market	9,246
20-Sep	UCLA Football vs. Arizona (12:30 pm)	59,434

2008 Event Attendance Numbers		
27-Sep	UCLA Football vs. Fresno State (12:00 pm)	62,903
October		
4-Oct	UCLA Football vs. Washington State	53,289
12-Oct	RG Canning Flea Market	10,287
18-Oct	UCLA Football vs. Stanford	49,984
November		
8-Nov	UCLA Football vs. Oregon State	64,273
9-Nov	RG Canning Flea Market	13,344
14-Nov	High School Football - John Muir High vs. Pasadena High	26,146
December		
6-Dec	UCLA Football vs. USC	80,045
8-Dec	Rose Bowl Half Marathon	1,500
9-Dec	RG Canning Flea Market	9,252
	2008 ATTENDANCE TOTAL	**701,257**

Note: To account for round trips (2 trips = I round trip), employee trips, delivery truck trips and other trips needed to facilitate the attendance at the stadium, the trip rate for the stadium land use was determined at 3.5 trips per occupied seat (or 2008 attendance). However the "Unit" field in Urbemis will only accept values below 100,000 occupied seats. In order to account for the full stadium attendance, the occupied seats were divided by 10 (701,257/10 = 70,125.7), and the trip rate was multiplied by 10 (3.5 x 10 = 35).

Transportation Emissions and Transit Service:

Transportation Assumptions for 1990 and 2007 include 90% of streets with sidewalks on both sides and 10% of streets with sidewalks on one side. For a comprehensive vehicle breakdown see Appendix C, D an E for the Urbemis breakdown.

Transit Oriented District –Gold line

2007 plan or build does not include actual usage of the Gold Line. Thought the Gold Line was in service in 2007 the Urbemis model could not quantify partial usage.

2020 BAU includes reductions associated with transit but does not include transit oriented development.

2020 with existing city programs includes a full suite of transit reductions including transit oriented development.